DECLARATION

I, TAKAO OCHI, a Japanese Patent Attorney registered No. 10145, of Okabe International Patent Office at No. 602, Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo, Japan, hereby declare that I have a thorough knowledge of Japanese and English languages, and that the attached pages contain a correct translation into English of the priority documents of Japanese Patent Application No. 11-098722 filed on April 6, 1999 in the name of CANON KABUSHIKI KAISHA.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made, are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

signed this 11th day of January, 2007

_____
Takao Ochi

PATENT OFFICE
JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy of the following application as filed with this Office.

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Application Number: Japanese Patent Application
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Applicant(s):   CANON KABUSHIKI KAISHA

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Commissioner,
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[Title of the Invention]	Image Processing Method, Driver, Operating System, Scanner, And Memory Medium
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[List of Filed Materials]

    [Material]   Specification 1

    [Material]   Drawings   1

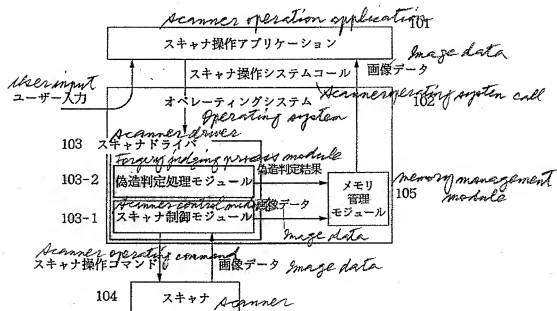   [Material]   Abstract   1

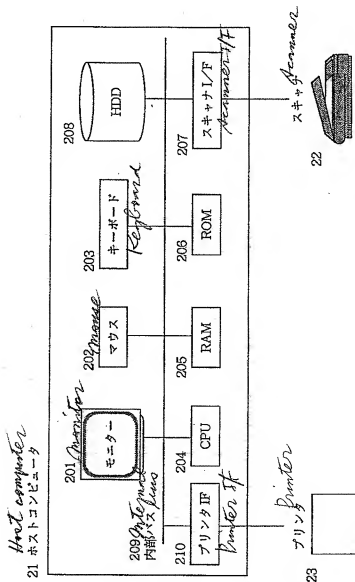   [General Power of Attorney] 9703271

[Proof Requirement]   Required
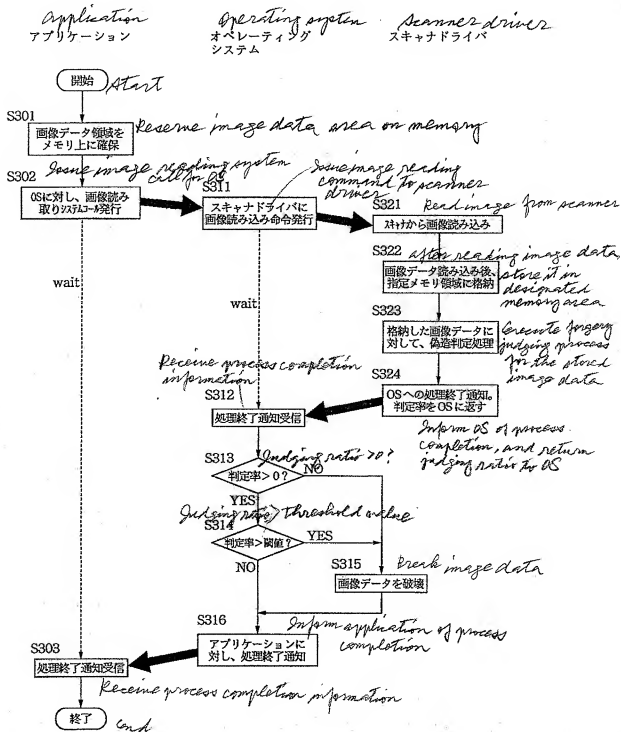
【書類名】　　　図面　　　[Name of the Document] Drawings

【図1】　Fig. 1

Scanner operation application

| スキャナ操作アプリケーション | 101 |

スキャナ操作システムコール　画像データ　Image data
Scanner operation system call　102

user input
ユーザー入力

オペレーティングシステム
Operating system

Scanner driver
103　スキャナドライバ

Forgery judgment process module
103-2　偽造判定処理モジュール　偽造判定結果

Scanner control module
103-1　スキャナ制御モジュール　偽造データ

メモリ管理モジュール　105　memory management module

Image data

Scanner operation command
スキャナ操作コマンド　画像データ　Image data

104　スキャナ　scanner

【図２】　Fig. 2

Host computer
21 ホストコンピュータ

201 モニター Monitor
202 マウス mouse
203 キーボード Keyboard
204 CPU
205 RAM
206 ROM
207 スキャナI/F Scanner I/F
208 HDD
209 内部バス Internal bus
210 プリンタIF Printer IF

22 スキャナ Scanner
23 プリンタ Printer

【図３】　Fig. 3

application　　　　Operating system　　　Scanner driver
アプリケーション　　オペレーティング　　　スキャナドライバ
　　　　　　　　　　システム

（開始）Start

S301
画像データ領域を
メモリ上に確保　Reserve image data area on memory

S302　Issue image reading system call for OS
OSに対し、画像読み
取りシステムコール発行　→

Issue image reading command to scanner driver

S311
スキャナドライバに
画像読み込み命令発行　→

S321　Read image from scanner
スキャナから画像読み込み

S322　after reading image data, store it in designated memory area
画像データ読み込み後
判定メモリ領域に格納

S323　Execute forgery judging process for the stored image data
格納した画像データに
対して、偽造判定処理

S324
OSへの処理終了通知、
判定率をOSに返す

Inform OS of process completion, and return judging ratio for OS

wait　　　　　　　　wait

Receive process completion information
S312
処理終了通知受信　←

S313　Judging ratio > 0 ?
判定率＞0？　NO →
YES

S314　Judging ratio > threshold value
判定率＞閾値？　YES →
NO

S315　break image data
画像データを破壊

S316　Inform application of process completion
アプリケーションに
対し、処理終了通知

S303
処理終了通知受信　←
Receive process completion information

（終了）end

11-098722

Applicant's Information

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   (Reason of Change)   New Registration
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2000-3031467

[Name of the Document]   Specification

[Title of the Invention]   Image Processing Method,

                          Driver, Operating System,

                          Scanner, And Memory Medium

[What is Claimed is]

     [Claim 1]

     An image processing method, comprising steps of:

     outputting a scanning command to a scanner;

     judging whether an image corresponding an image signal obtained from the scanner in response to the command represents a specified image; and

     outputting a result obtained in said judging step so as to use the result in a processing of the image signal.

     [Claim 2]

     A method according to claim 1, wherein said outputting step outputs to an operation system executing the process on the image signal according to the result obtained in said judging step.

     [Claim 3]

     A method according to claim 1, wherein said judging step executes judgement using template matching.

     [Claim 4]

     A method according to claim 1, wherein a process of obtaining the image signal from the scanner is executed by a scanner module, and the process of judging whether the image corresponding to the image signal represents the

specified image is executed by a forgery preventing module.

[Claim 5]

A method according to claim 1, wherein said judging step executes judgement on the image corresponding to the image signal and plural specified images.

[Claim 6]

A method according to claim 1, wherein said judging step executes judgement with an image signal obtained by spatial thinning of the image signal.

[Claim 7]

A method according to claim 1, wherein said judging step executes judgement executed with an image signal obtained by reducing the number of bits of the image signal.

[Claim 8]

A method according to claim 1, wherein said judging step terminates judgement when there is obtained a high judgment rate indicating that the image corresponding to the image signal obtained from the scanner represents the specified image.

[Claim 9]

A method according to claim 1, wherein said judging step executes judgement with an image signal obtained by spatial thinning of the image signal, and, if the result obtained in said judging step indicates a high probability of a specified image, said judging step executes judgement with the image signal without thinning.

[Claim 10]

A method according to claim 9, wherein said judgment with the unthinned image signal is executed by using only the image signal in an area containing an object of judgment within the thinned image signal.

[Claim 11]

A method according to claim 1, wherein said judging step execute second judgement when a high judgment rate is obtained in a first judgment in two kinds of judgements provided for a same specific image.

[Claim 12]

A computer readable memory medium which stored codes for executing the method according to claims 1 to 11.

[Claim 13]

An operating system for obtaining a result of judgment indicating whether an image corresponding to an image signal obtained by scanning represents a specified image; and

executing a process according to the obtained result of judgment.

[Claim 14]

An operating system according to claim 13, wherein said judgment is executed in a scanner driver.

[Claim 15]

An operating system according to claim 14, wherein information indicating whether said judgment has been executed is obtained from said scanner driver.

[Claim 16]

An operating system according to claim 13, wherein

said process is a working on said image signal.

[Claim 17]

An operating system according to claim 13, wherein said process is a process of ending (closing) an application functioning on said operating system.

[Claim 18]

An image processing method comprising steps of:

outputting an image signal generating command to an input device;

judging whether an image corresponding to the image signal obtained from said input device in response to said command represents a specified image; and

outputting a result obtained in said judging step for use for a process of said image signal.

[Claim 19]

A method according to claim 18, wherein said input device is a digital camera, a digital camcorder, a film scanner, a compact disk, a minidisk or a DVD.

[Claim 20]

A driver which executes an image processing method according to claims 1 to 11 and claims 19 to 20.

[Claim 21]

A scanner which executes an image processing method according to claims 1 to 11 and claims 19 to 20.

[Detailed Description of the Invention]

[0001]

[Field of the Industrial Utilization]

The present invention relates to an image processing method, a driver, an operating system, a scanner and a memory medium.

[0002]

[Prior Art]

As a result of recent improvement in the performance of the color image reading device utilizing CCD or the like (such device being hereinafter called color scanner) and of the color printer, there is increasing danger of forging or unlawful reproduction of an original of which reproduction is forbidden, such as a banknote, a traveler's check or a valuable security document, by reading such original by the color scanner as the image data and printing such image data by the color printer. In order to prevent such forging, the color copying apparatus consisting of a color scanner and a color printer often incorporates a forgery preventing device which inhibits the copying operation by recognizing the original of which reproduction is forbidden.

[0003]

[Problems to be Solved by the Invention]

However, the forgery preventing device employed in the color copying apparatus functions only in the copying operation, and, if the original forbidden for reproduction is once read by a color scanner, the obtained data can be outputted by a color copying apparatus or another color printer through a controller, so that the original is eventually forged. In consideration of the foregoing, an object of

the present invention is to provide an image processing method capable of executing forgery prevention securely and efficiently, a driver, an operating system, a scanner and a memory medium.

[0004]

[Means for Solving the Problems]

In order to achieve the above-mentioned object, according to the present invention, there is provided an image processing method, comprising steps of:

outputting a scanning command to a scanner;

judging whether an image corresponding an image signal obtained from the scanner in response to the command represents a specified image; and

outputting a result obtained in said judging step so as to use the result in a processing of the image signal.

[0005]

[Description of the Preferred Embodiments]

Fig. 1 is a view showing the configuration of a scanner system including a host computer and constituting an embodiment of the present invention. On the host computer, there functions an operating system 102 (hereinafter written as OS), and a scanner operating application 101 functioning thereon provides an operating environment for example for an image reading operation of a scanner 104.

[0006]

The scanner system shown in Fig. 1 is realized by a hardware configuration shown in Fig. 2, wherein the scanner

system is composed of a host computer 21 and a scanner 22. The host computer 21 is provided with a monitor 201 for displaying GUI of the application 101 and the result of image reading from the scanner; a mouse 202 and a keyboard 203 for transmitting the input by the user to the application and the OS; an HDD 208 for storing various programs and image data; a ROM 206 for storing the basic program of the host computer; a RAM 205 for storing read programs and images; and a scanner I/F 207 for controlling the scanner 22, which are mutually connected by an internal bus 209 and controlled by a CPU 204.

[0007]

On the host computer 21 of the above-described configuration, both the OS and the application realize the following processes by the execution, by the CPU 204, of the program read from the HDD 208 to the RAM 205.

[0008]

In the following there will be explained the internal structure of the OS within an extent necessary for explaining the present embodiment. In most OS, like UNIX, there are separately realized a device driver for interfacing with the hardware such as the scanner, and a module for managing other user applications and the memory. The present embodiment will be explained in the following by an OS having such separate structure.

[0009]

The OS 102 is provided, as a module for controlling

the scanner in addition to controlling the user input and other hardware devices, with a scanner driver 103, which, in the present embodiment, is provided with a scanner control module 103-1 for directly controlling the scanner 104 and a forgery judging module 103-2 for judging whether the image fetched from the scanner is forbidden for reproduction. The OS is further provided with a memory management module 105 for managing the image data area.

[0010]

  The scanner operating application 101 is composed for example of a GUI routine for interfacing with the user, a routine for interpreting the user input received through the OS 102 and issuing a command for operating the scanner, a routine for displaying the image read from the scanner; a routine for storing the read image on the HDD etc. Such GUI is displayed on the monitor 201, and various user inputs, for example starting the scanning operation, are entered by the mouse 202 and the keyboard 203.

[0011]

  The scanner 104 scans and electronically reads an original, placed on an original table, by a CCD line sensor according to a scanner operation signal from the scanner driver, and sends an image signal to the host computer according to a predetermined interface rule. The image signal is divided into plural color components, for example R, G and B, each being multi-value data of 8 to 12 bits.

[0012]

In the following there will be explained in detail the function of the present embodiment of the above-described configuration, with reference to the attached drawings. Fig. 3 shows an example of the operation sequence of the scanner system, on the modules of scanner operating application, OS and scanner driver.

[0013]

When the user instructs a scan start operation through the scanner operating application by a manual operation with the mouse/keyboard on the GUI, the scanner initiates the image reading. When the application starts the reading operation, the application secures, on the RAM, an area for the designated image to be read in a step S301, then issues an image reading command specifying the scanner to the OS in a step S302, and then enters a waiting state until an image reading end notice is received in a step S303.

[0014]

In response to the scan start command, the OS calls, in a step S311, a scanner driver module corresponding to the specified scanner, then issues a command for image reading from the scanner, and enters a waiting state until the process of the scanner driver is terminated. In this operation, the forgery preventing module is outputted on the OS side, and prepares a judgment rate representing whether the image data are of an original forbidden for reproduction as a variable, and a negative initial value is assumed for the variable.

[0015]

In response to the scan start command from the OS, the scanner control module in the scanner driver provides, in a step S321, the scanner with a scan start command specific to such scanner.

[0016]

In a step S322, after image reading, the image signal received from the scanner is stored in the image data area secured by the application on the RAM, and the sequence is transferred to the forgery judgment module.

[0017]

The forgery judgment module is provided, as a template, with a reproduction forbidden pattern on a memory (RAM or ROM) separate from the image memory. A step S323 executes pattern matching between the stored image data and the template, and outputs a judgment rate of a value between 0 and 100. An example of such pattern matching consists of calculating the mutual correlation between the image data and the template for each color component and outputting the maximum value, but the method of such pattern matching is not particularly restricted.

[0018]

Also the template for the reproduction forbidden pattern may be provided in plural units, and, in such case, the pattern matching is conducted between the image data and the plural patterns and the obtained maximum value can be outputted. In the foregoing, the forgery preventing

module has been explained as a software module, but it may also be realized by a hardware for faster processing. Also in case of the process with the software module, the process time can be shortened for example by (1) preparing a spatially skipped (thinned) image signal from the stored image signal and executing judgment by the above-mentioned forgery judgment module on such skipped image signal, or (2) reducing the number of bits of the stored image signal for example from 8 bits to 5 bits and executing judgment by the above-mentioned forgery judgment module on the image signal with thus reduced number of bits.

[0019]

After the image data reading and the forgery judging process, the scanner driver informs the OS of the end of process and returns the judgment rate thereto. The OS receives the notice for the end of process from the scanner driver in a step S312, and checks, in a step S313, the sign of the judgment rate returned from the scanner driver. A negative sign indicates that the scanner driver does not execute the forgery judgment process ,or that the scanner driver is not equipped with the forgery judgment process. In such case, the image data may be of an original forbidden for reproduction, so that a step S315 destroys the image data for example by black-out of the image data area (conversion to black data). Otherwise, for a stricter measure, the image data area is for example opened by the memory management module to refuse the image data reception by the OS.

[0020]

On the other hand, a positive sign indicates that the scanner driver has executed the forgery judgment process, so that the sequence proceeds to a step S314, which discriminates whether the image data are of an image forbidden for reproduction by an actual forgery judgment process. If the judgment rate is larger than a threshold value set in advance by the OS, the image data are regarded as an image forbidden for reproduction, and a step S315 destroys the image data.

[0021]

It is also possible to set plural threshold values by the OS and to vary the measure to be taken according to the magnitude of the judgment rate. For example if the judgment rate, ranging from 0 to 100, is larger than a threshold value 95, the image data can be almost certainly an image forbidden for reproduction and the image data area is opened. This results in a strict measure that the application is forcedly closed. In such case it is necessary to inform the user of the reason for such forced closing of the application, there is given, a GUI display indicating that the application is closed by an illegal use and the application is thereafter closed. Also in case the judgment rate is larger than a threshold value 80 but smaller than 95, there can be conceived a measure of blacking out the image. Also in such case, there is given, a GUI display indicating the reason of image black-out. After the judgment of the step S314 or the process of the step S315 by the OS, a step S316 sends a notice for

the end of process to the application, whereupon the image reading operation of the scanner system is terminated.

[0022]

In the present embodiment, as explained in the foregoing, in acquiring the image signal by the scanner, there is judged the similarity between the obtained image signal and a specified image (image corresponding to a banknote or a valuable security document), and, in case of a high similarity (high judgment rate), the image signal is destroyed or the application is closed according to the result of such judgment, whereby prevented is the acquisition of a specified image for which the image formation is prohibited.

[0023]

Also by executing the above-described judgment at the image signal scanning at the most upstream part in the sequence from the scanner through the host computer to the printer, there can be securely prevented the acquisition of the image signal, for which the image formation is prohibited, in a system consisting of a scanner, a host computer for image editing and a printer for image formation.

[0024]

Also in case there is connected a printer not equipped with the function of judging a specified image, there can be securely prevented the printing of the image signal, corresponding to the image for which the image formation is prohibited, by providing the scanner driver or the OS with such function of judging the specified image.

[0025]

(Other Embodiments)

The foregoing embodiments executes judgment on the image signal obtained from the scanner driver and the OS.

[0026]

However, in the configuration executing the judgment of the specified image by the scanner driver and the OS, the judgment becomes impossible in case of employing a scanner driver not supporting the judgment of the specified image in the foregoing embodiment.

[0027]

It is therefore possible also to provide the OS alone with the aforementioned judging function for the specified image, thereby executing the judgment of the image signal obtained in the scanner by the OS itself.

[0028]

As an alternative method for avoiding the above-mentioned drawback that the judgment becomes impossible in case of a scanner not supporting the judgment of the specified image in the foregoing embodiment, it is also possible to provide the printer driver with the aforementioned judging function for the specified image, achieved by the scanner driver in the foregoing embodiment, thereby executing the judgment of the specified image by the OS and the printer driver.

[0029]

More specifically, in this case, in response to

the print command entered from the mouse or the keyboard, the printer driver execute template matching on the image signal to be printed, stored in the memory management module of the OS, thereby judging whether the image consisting of the image signal is a specified image, and informs the OS of a judgment rate corresponding to the result of judgment.

[0030]

     According to the result of judgment, the OS either destroys the image data or forcedly closes the application as in the foregoing embodiment.

[0031]

     Also the template may be provided in plural units for judging plural valuable security documents.

[0032]

     Also as an alternative method for avoiding the above-mentioned drawback that the judgment becomes impossible in case of a scanner not supporting the judgment of the specified image in the foregoing embodiment, it is also possible to refer to the version information of the scanner driver by the OS, and, if the scanner driver is identified as not supporting the judgment of the specified image, to display an operation image on the monitor 201 for requesting the user to download a scanner driver supporting the judgment of the specified image through a network (for example Internet).

[0033]

     The scanner driver supporting the judgment of the

specified image can be downloaded by a manual instruction of the user in response to such operation image.

[0034]

Also in the foregoing embodiment, there is adopted the template matching on the image signal after spatial pixel skipping or after reduction of the number of pixels, in order to reduce the judgment process time.

[0035]

As an alternative method of increasing the speed of judgment process, there can be adopted a configuration of preparing a template for a part of the specified image (for example a watermark portion, a number portion or a stamp portion in case of a Japanese banknote) and transmitting the high judgment rate to the OS at a timing when such part of the specified image is judged, whereby the judgment can be completed without judging the entire image signal corresponding to the specified image but executing the judgment only on the above-mentioned part.

[0036]

Thus the time required for judgment can be shortened despite of the judgment process executed by a software process.

[0037]

Also an even faster judgment process is possible by employing the image signal subjected to spatial pixel skipping or reduction in the number of pixels as in the foregoing embodiment and adopting the above-mentioned configuration of utilizing the template corresponding to

a part of the specified image and outputting the high judgment rate at the completion of judgment of the above-mentioned part, instead of executing judgment on the entire image signal corresponding to the specified image.

[0038]

Furthermore, as the probability of finding the specified image among the scanned images is generally low in most cases, it is possible to execute the approximate judgment with such high-speed method, and, if the judgment rate is high in such approximate judgment, to read the image signal without skipping from RAM in an image portion corresponding to the template in the above-mentioned approximate judgment and to execute the fine judgment with a separate template without data skipping prepared for the fine judgment, thereby achieving high-speed judgment and obtaining secure result for the image which is doubted as a specified image.

[0039]

Also, the accuracy of judgment of the specified image may be deteriorated if a part thereof is employed as the template for judging such specified image.

[0040]

It is therefore possible to prepare a template corresponding to a portion of the specified image and another template corresponding to another portion of the specified image, and, if the judgment rate is high in the judgment employing the former template corresponding to a portion

of the specified image, to execute the judgment with the another template (time-shared judgment) and to destroy the image data only if the judgment rates exceed the threshold values in both templates, thereby reducing the probability of erroneous judgment and realizing highly accurate judgment.

[0041]

The foregoing embodiments have been explained by flow charts indicating the process sequence, but the present invention naturally includes also a computer readable memory medium capable of generating in succession codes corresponding to such process sequence.

[0042]

Also the foregoing embodiments have been explained by a configuration of obtaining the image signal from the scanner.

[0043]

However the present invention is naturally effective also in case of acquiring image signal from various input devices such as digital camera, digital camcorder, compact disk, mini disk, DVD, film scanner etc., for executing judgment by the driver and OS of such input or reproduction device as to whether such image signal belongs to a valuable security document.

[0044]

[Technical Advantages of the Invention]

As explained in the foregoing, the above-described configuration is adapted to output a scan command to the

scanner, to judge whether the image, corresponding to the
image signal obtained from the scanner in response to the
scan command, represents a specified image, and to output
the result of judgment for use in the processing of the
image signal. Therefore, for example in a sequence consisting
of a scanner, then a host computer and a printer, the
above-mentioned judgment is executed in the most upstream
timing of acquiring the image signal, thereby securely
preventing the acquisition of the image signal corresponding
to the specified image in a system consisting of a scanner
for image data acquisition, a host computer (editing apparatus)
for editing process and a printer for image formation.
Also there can be achieved high-speed and accurate judgment.
[0045]
        Also the function of judging the specified image
can be provided even if the scanner does not support the
judgment of the specified image.
[0046]
        Also the function of judging the specified image
can be provided corresponding to various input devices.
[0047]
        Also there is provided an operating system capable
of acquiring the result of judgment indicting whether the
image signal obtained by scanning represents the specified
image and executing a process according to thus acquired
result of judgment, whereby the process in the operating
system can be securely based on the result of judgment of

the specified image.

[0048]

[Brief Description of the Drawings]

[Figure 1]

A view showing the configuration of the present invention.

[Figure 2]

A view showing an example of the configuration of the present embodiment.

[Figure 3]

A flow chart showing the function of the present invention.

[Name of the Document]   Abstract

[Abstract]

[Object]

 There is provided an environment where a specified image cannot be obtained, by providing the scanner or the input device with a function of judging the specified image.

[Means for Achieving the Object]

 A scan command is given to a scanner (scanner operating command in Fig. 1), then the image corresponding to the image signal obtained from the scanner in response to the command is judged whether it represents a specified image (forgery judging module in Fig. 1), and the result of such judgment is outputted for use in processing the image signal (result of forgery judgment in Fig. 1).

[Elected Drawing]

 Figure 1